



First Aero Weekly in the World.

Founder and Editor : STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT

THE controversy which has occupied so much space in the daily press lately relating to the effect on ships of bombs dropped in their immediate vicinity appears to us to have strayed considerably from the points at issue. Lord Lee of Fareham has explained the views of the Admiralty and of the Navy on the matter, and Lord Graham, who was responsible for the aeroplane carrier H.M.S. *Argus*, and General Groves, whose excellent articles in *The Times* were the immediate cause of the controversy, have in turn stated the case for aircraft. Lord Lee contends that even large bombs, if so dropped as not to be in actual contact with the side of a ship, have an effect equivalent only to a much smaller quantity of explosives which is in actual contact with the ship. We are not at all convinced that Lord Lee is right in this contention. However, even if it is granted that he is right, and that *actual contact* is necessary for the full effect of explosives dropped from aircraft, we think that he has failed to take into account the dropping of torpedoes from aircraft. He will there get all the actual contact he wants, with the further advantage on the side of aircraft that if one or two or ten are destroyed the loss in men and material will be insignificant, while out of an attacking air squadron some are certain to get through and find their mark.

But, as we have already mentioned, and as Gen. Groves points out in a letter to *The Times*, the amount of damage which aircraft can do to battleships is a mere detail of the much greater problems at issue. These are that in the next war the Navy by itself cannot protect us against air attacks, no matter how efficient it is or how many battleships it possesses. Aircraft, and aircraft only, can do that. This is the main issue which we should keep in mind, and at the present moment this country has to all intents and purposes no such defence against aerial invasion. No

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :

- 1922.
- April 17 R.Ae.C. Race Meeting, at Waddon
- April 17-19 Seaplane Contest, Marseilles
- June 1 Entries close for Schneider Cup Race
- June 5 R.Ae.C. Easter Race Meeting, at Waddon
- June 23-25 International Competition for Touring Aeroplanes, Brussels
- July 6-20 French Gliding Competition
- Aug. 6 Gordon-Bennett Balloon Race, Geneva
- Aug. 7 R.Ae.C. Race Meeting, at Waddon
- Aug. (last fortnight) Schneider Cup Seaplane Race, at Naples
- Sept. Tyrrhenian Cup, Italy
- Sept. Italian Grand Prix
- Sept. or Oct. R.Ae.C. Race Meeting, at Waddon
- Sept. 22 Coupe Deutsche (300 kil.)
- 1923.
- Dec. 1 Entries Close for French Aero Engine Competition
- 1924.
- Mar. 1 French Aero Engine Competition.

one has proved that there is any other way of establishing and maintaining such a defence than the "striking force" advocated by Gen. Groves.

Rear-Admiral S. S. Hall, in a letter to the Press, makes some stringent remarks about our Naval Staff and its doctrines, and he emphasises that the reason why he considers the building of two battleships a waste of money is that close blockade is dead, and there is no one we can distantly blockade. It is not, he points out, a question of one aeroplane being only able to sink an old battleship in shallow water, but of future air attack when clouds of planes will attack at dusk, dawn, or by moonlight the ships before they go to sea.

A trenchant contribution to the controversy is that of Mr. T. G. Tulloch in *The Times*, who calls attention to the seemingly obvious fact, which is nevertheless often lost sight of, that a three-dimensional weapon, such as aircraft and, to a somewhat more limited extent the submarine, must defeat two-dimensional weapons, such as surface-vessels. This writer concludes with the following very telling paragraph : "Having regard to aerial warfare, Great Britain is no longer an 'island'; therefore why try and defend it as if it were?" Precisely. That is the whole crux of the matter. As to how many bombs it would take to sink a battleship, and how many machines would be shot down in the attempt, these are merely incidental problems which do not greatly affect the argument one way or the other. The defence against aircraft attack on cities, factories, shipyards, camps, etc., is the problem with which we are faced, and certainly for that purpose the Navy is useless. That the air arm can also by itself protect us against naval attack we are not so convinced, although we fully realise the help which the air can, and should to a vastly greater extent than has hitherto been the case, give to the Navy in this respect. We are rather afraid that some of those who have contributed to the controversy have been carried away by their enthusiasm and belief in the air, and led to claim for the air arm feats which it has not yet been proved capable of performing. We fully believe that some day, and probably not so far distant as might be imagined, the air will be able to do all these things, but that time is scarcely yet, and possibly a certain amount of harm has been done to the cause of the air by these somewhat extravagant claims.

Air Council and the Airship Scheme

The airship scheme proposed by Commander Burney, details of which were published in FLIGHT last week, has now, it is announced, been considered by the

Air Council, but it is stated that in their original form the Air Council regarded the financial conditions as imposing too severe a liability on the Government. Commander Burney has since submitted certain modifications which are now being considered by the Air Council. These include an offer to repay the whole of the money advanced as subsidy at the rate of £25,000 a year as soon as the company is in a position to relieve the Government of liability under the interest guarantee. This certainly appears to be a very fair offer, and as it is understood that the Air Council's refusal to accept the original scheme was based upon financial considerations, and not on any doubts as to the feasibility of the scheme, there is, perhaps, a possibility of the revised offer being accepted. The potential value of the scheme to Imperial defence is such that we sincerely hope that the Air Council may regard it favourably.

The Air Disaster

The mid-air collision which occurred in France last week is a most regrettable accident, the more so in view of the recent inauguration of one of the services involved, viz., the Daimler Airway, to which reference is made below. It is, however, an accident which is not very likely to occur again, even if the somewhat elaborate schemes that have been suggested are not adopted. The probability of two machines meeting nose-on in this fashion is very remote. At the same time we cannot afford not to take every precaution which tends to make flying safe, and the recent accident points to the desirability of making provision for the prevention of a recurrence. It has been suggested that machines travelling in one direction should fly at one altitude, and those going the opposite way at a different height. Also that each should keep a mile or two to the right of the general route. Both plans are open to objections on the part of the pilots, who usually like to follow a certain route, especially in thick weather. It might, however, be found possible to combine the two; that is to say, the machines going in one direction flying slightly to the right of the route and at a certain altitude, while those going the opposite way fly also to the right and at a different altitude. This arrangement would, however, necessitate an almost complete duplication of emergency landing grounds, while pilots might object to being restricted to certain altitudes, owing to the difficulties which would be encountered in the matter of flying by landmarks. It is true that wireless direction finding is now proving very useful to pilots flying out of sight of the ground, but the fact remains that most pilots are averse to flying above clouds, out of the sight of the ground. That may be mostly prejudice, but until confidence in the wireless has been firmly established, it is a very easily understood prejudice.

We think that, as a matter of fact, no such alteration in the arrangements is necessary, at any rate for some time. It should be comparatively easy to provide machines with short-range transmitting and receiving sets, all tuned alike, by means of which, in thick weather, a pilot could be apprised of the approach of another machine while still some miles apart. In most cases this would probably be found sufficient to ensure that the pilots of approaching machines would see one another while there was still plenty of time to alter course and avoid collision.

The New Air Services

Commencing last week, the air services to Paris have been augmented by the new service established by the Daimler Airway, and by accelerated services by the older companies. In addition to the usual air mail leaving Croydon at 12.30, there is now a morning service leaving at 9.30. By the new service letters posted in London too late for the ordinary night mail dispatch to Paris, but in time for the last night collections, will normally be delivered in Paris on the following afternoon.

In addition to the increased activity on the London-Paris route, it is rumoured that a London-Manchester service is a probable starter soon, and it is stated that other lines radiating from Manchester are in contemplation—for instance, one linking Manchester with Dublin. Altogether, therefore, it looks as if civil aviation is to have a busy season, and signs are not lacking that we are now over the worst difficulties and that henceforth commercial aviation will develop fairly rapidly towards that importance which it is destined ultimately to hold.

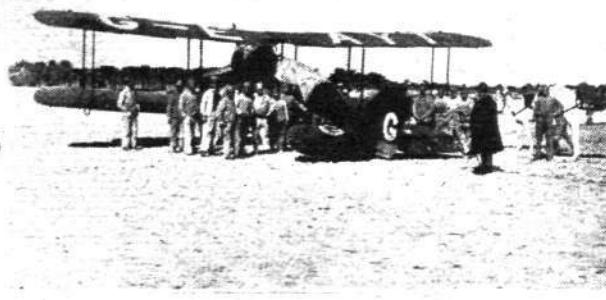
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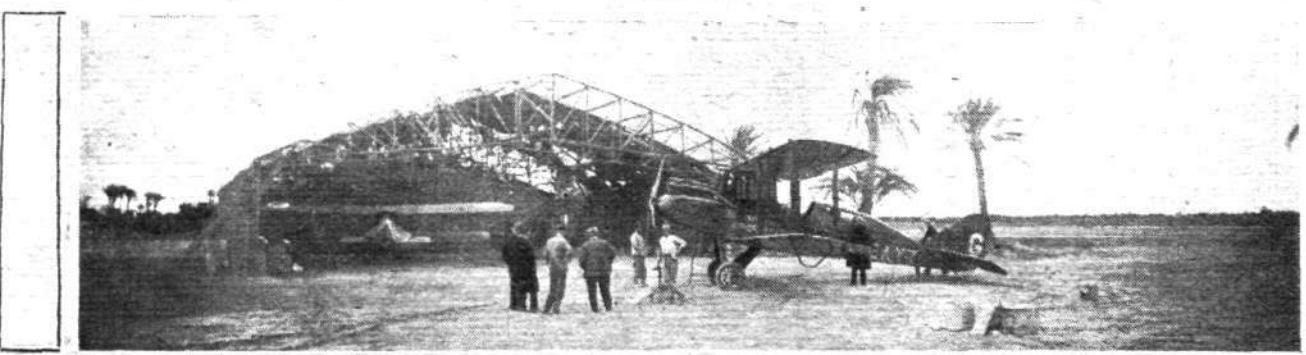
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"BLAZING THE TRAIL": Some photographs secured by Mr. Cobham's passenger on the 6,000 miles tour.

1. The D.H.9c at Batna.
2. Aerial view of Constantine in Algeria.
3. The machine on the natural aerodrome at Touggourt.
4. Mounting guard over the machine at Batna.
5. Sahara from above. Just beyond the wing tip may be seen Touggourt.
6. A bit of local atmosphere. The machine and a hangar (of sorts) at Biskra ("Garden of Allah").

"BLAZING THE TRAIL"

Mr. Cobham's 6,000 Miles

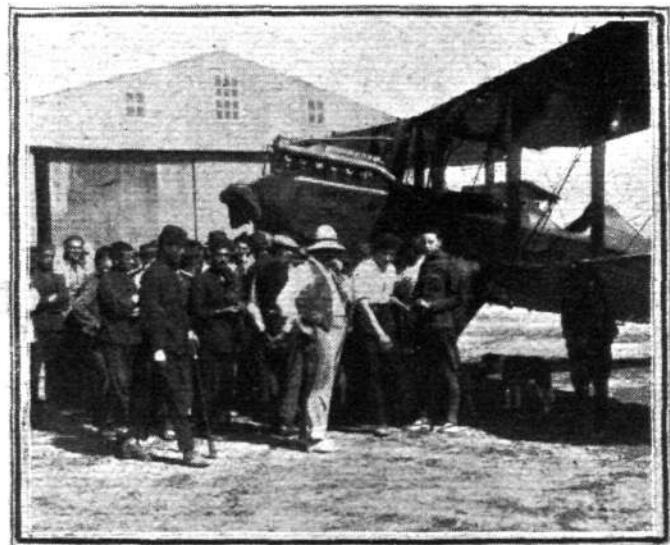
As an example of what an Englishman can do when he makes up his mind, it would be hard to beat Mr. Alan Cobham's performance of flying, with a passenger, from London to Paris, Toulouse, Barcelona, Alicante, Malaga, Gibraltar,



**Captain Martel, of the French Artillery at Fez, and
Mr. Cobham.**

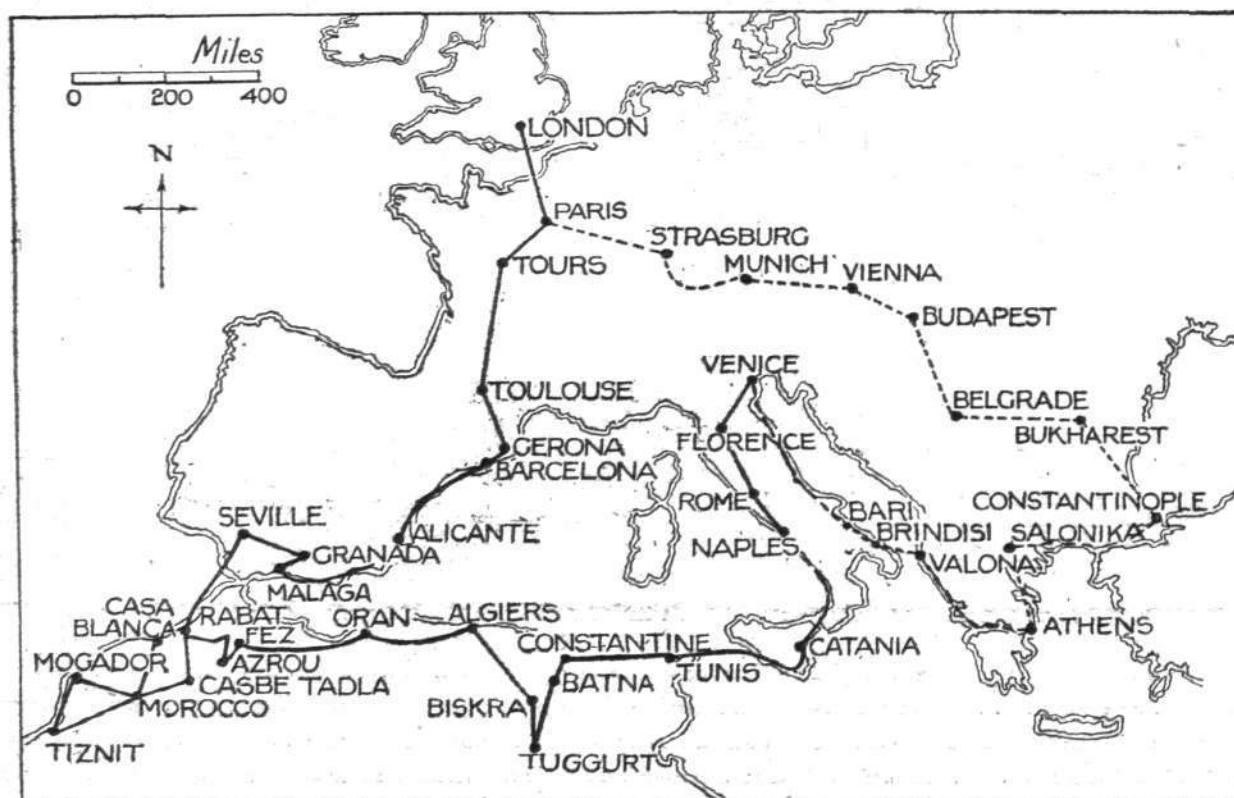
Rabat, Casa Blanca, Morocco, Fez, Orano, Algiers, Touggourt, Batna, Constantine, Tunis, Catania, Messina, Napes, Rome, Florence and Venice. The machine used was a D.H.9c, with Siddeley "Puma" engine, and we understand that

throughout the journey neither machine nor engine gave the slightest trouble. Truly a marvellous performance, when it is remembered that the tour was made without any ground organisation whatever, and that Mr. Cobham had to be his own engineer, looking after machine and engine each day after the end of a flight. We regret that space does not allow of publishing the details of this marvellous flight, but it does not require any very vivid imagination to picture what changing conditions were, must have been, met with. The



La Rache Aerodrome, Spanish Morocco : The Air Service between Seville and La Rache is run with D.H.9c machines. Our photograph shows the arrival of the first machine after the inauguration of the service.

tour was made in a leisurely fashion, it is true, but even so certain stretches of the journey presented great difficulties. These were, however, all overcome, until fate overtook Mr. Cobham at Venice. He was actually within sight of the aerodrome, when a fog suddenly blotted out all land-marks. He wisely decided to come down in the sea, which he managed to do successfully, and he and his passenger were ultimately



Sketch-Map of the route followed by Mr. Cobham on his tour.

rescued unhurt, although the machine and engine suffered considerably from the effects of the salt water.

Incidents from Mr. Cobham's tour have been recorded from time to time, but we have now obtained some photographs, taken by the passenger, which will, we think, be found of interest as showing unfamiliar country and surroundings. Some of these photographs will be found on p. 211.

The accompanying sketch-map will give a better indication of the route followed and the countries visited than could any descriptive matter, and will give a very good idea of the magnitude of the trip. From Venice onwards, the dotted line route indicates the remaining portion of the tour, which was cut short by the accident at Venice. It will be seen that considerably more than half of the tour was successfully completed, and had Mr. Cobham chosen to

■ ■ ■ "WHAT CAN WE DO WITH OUR SONS?"

SIR SAMUEL INSTONE makes the following valuable and practical contribution to the discussion which has been raging so furiously recently in *The Times*:

"I think a great deal can be done for 'our sons' in civil aviation. It offers an opening for young men, and should be supported. In the late war all the officers in the mercantile marine became officers in the Royal Navy, and their work in defeating the submarines and in other operations at sea was of inestimable value. In the next war, there is every reason to suppose, aircraft will be a predominant factor, and the importance of having an adequate reserve of officer pilots cannot be over-estimated. I think, therefore, in the interests of national security, the Government should grant a subsidy to the civil aviation companies to be used solely for the training of pilots, so that, in time of war, there shall be an adequate reserve of officer pilots to draw upon, in the same manner as they have drawn upon the officers of the mercantile marine."

Civil aviation, as it develops, will, on the other hand, offer a fresh lease of life to pilots in the Royal Air Force when they have ceased to be of value to the fighting service. Flying in the fighting service is a young man's job. Even in peace time, training for air warfare, with 'stunt' flying and the other risks that must be taken, puts a great strain upon the nerve, and the useful career of the fighting pilot comes to an end at a comparatively early age. In an 'omnibus' service of a commercial aviation company, where 'safety first' is the principal consideration, his career can be prolonged for another ten years, and the pay is good.

But we do not rely entirely upon taking over pilots from the Royal Air Force. We want to train our own pilot officers and mechanics, and for that purpose we have established a

■ ■ ■ NOTICES TO AIRMEN

Belgium : Ostend Aerial Lighthouse

1. An aerial lighthouse has been erected in the W. corner of the Ostend aerodrome, and is in operation in foggy weather, or after sunset, when the arrival of aircraft at the aerodrome is expected.

The light exhibited is a group occulting white light, showing five flashes every nineteen seconds, thus:—Light, 5 secs.; eclipse, 1 sec.; light, 2 secs.; eclipse, 1 sec.; light, 3 secs.; eclipse, 1 sec.; light, 2 secs.; eclipse, 1 sec.; light, 2 secs.; eclipse, 1 sec.

Note.—This light is additional to and should not be confused with the marine light at Ostend Harbour, notified in Notice to Airmen No. 106 of 1921.

(No. 32 of 1922.)

Honours

H.M. THE KING has granted unrestricted permission for the wearing of the following decoration, which was conferred by H.M. the King of the Belgians for valuable service in connection with the War:—

Order of the Crown (Off.)

Maj. (acting Lieut.-Col.) A. V. Holt, D.S.O.

Imperial Airship Scheme under Consideration

THE Air Ministry announces that the Imperial Airship Scheme submitted by Commander Burney has been under the consideration of the Air Council. In its original form, as communicated to the Press, the Air Council regarded the financial conditions as imposing altogether too heavy a liability on the Government. Commander Burney has

obtained another machine whereon to proceed, there is little doubt but that he would have accomplished the trip successfully. Even as it is, however, the tour is an achievement of which the pilot may well be proud, and when it is remembered that no organisation beyond that already existing was provided, the trip deserves to rank high among the flights of modern years. There was no question of covering enormous distances without landing, nor of completing a given distance in a minimum of time, but, what is, perhaps, even more useful, the tour demonstrated the reliability of modern air travel, and, incidentally, afforded an opportunity of doing very excellent propaganda work abroad.

Mr. Cobham's next adventure will, we think, attract even more attention, but about that nothing may be said at present.

■ ■ ■ WITH OUR SONS?"

scheme of apprenticeship for boys leaving school. We have begun with two apprentices, and we are prepared to take others. They will wear a distinctive uniform, as officers in the mercantile marine do. The articles of indenture are, I believe, the first that have been drawn up for a civil aviation company, and from that point of view the original document will one day become historic. They provide for a premium of £500, which need not necessarily be paid in one sum; and the parents are responsible for clothing and board and lodging. The period of apprenticeship is three years, and the apprentice receives as pocket money, 10s. a week in the first year, 15s. a week in the second year, and 25s. a week in the third year. The company undertake to give instruction in the profession of aviation at their Waddon aerodrome, Croydon, or elsewhere, which shall include a course in the engineering shops and flying instruction which will enable the apprentice at the termination of his apprenticeship to apply to the Air Ministry for a pilot's certificate. If, however, the apprentice is found to be unfit, on account of his state of health, or for other reasons, for final training as a pilot, then, during the last year of his apprenticeship, the company will instruct him solely with a view to his becoming qualified and efficient to act as a ground station engineer. If after the determination of his indenture, the apprentice secures from the Air Ministry a pilot's certificate, the company will employ him, or use their best endeavours to procure him an engagement with some other recognised company.

There will, I believe, be a wide scope for these boys. The Instone Air Line is establishing stations across the Empire, and as soon as protection is afforded, and machines are approved, station managers, technical experts and spare pilots will be required.

■ ■ ■ NOTICES TO AIRMEN

France : Aerial Lighthouses, Aerodromes, etc.

Aerial Lighthouses.—As from April 1, 1922, the hours of operation of the aerial lighthouses in France will be as shown below:—(i) The lighthouses at Valenciennes, Strasbourg, Lyons, Dijon, Nimes and Bordeaux, which are situated on routes over which night flights rarely take place, will only be lit by request. To test their working, they will also be lit for half an hour per week; (ii) The lighthouses of Le Bourget, Beauvais, Poix, Berck-sur-Mer and St. Inglevert will be lit regularly half an hour after sunset until two hours after sunset. They may also be lit at other times than those indicated, by request.

(No. 34 of 1922.)

Aerodromes for Civil Use

A CONSOLIDATED list has now been issued. (No. 35 of 1922.)

since made certain modifications in that scheme, and the revised proposals are being further considered by the Air Council. The existing airships and the airship bases at Cardington and Pulham are still in the possession of the Air Ministry, and have not been actually handed over to the Disposal Commission.

London-Brussels Route to be Opened

THE Air Ministry announces that the Instone Air Line has now been "approved" as the company to operate a subsidised air service between London and Brussels. This is welcome news, as the London-Brussels line may well prove a very important one in the future, linking up as it does this country with Northern and Central Europe. We should now like to see a seaplane service running to North Germany and the Scandinavian countries.

The Royal Aero Club of the United Kingdom

■ OFFICIAL NOTICES TO MEMBERS ■

SECOND CROYDON AVIATION RACE MEETING

(Under the Competition Rules of the Royal Aero Club and the Regulations of the Fédération Aéronautique Internationale)

At London Terminal Aerodrome, Croydon, Easter Monday, April 17, 1922, commencing at 3 p.m.

Club Handicap.—The Committee has decided to open this event to all types instead of confining it to machines of Avro type only.

Course.—The circuit for each event is approximately eight miles, the turning points being Waddon Aerodrome, a White Cross on the ground near Purley Downs Golf Club, and Beddington Cement Works.

Handicapping.—The handicaps will be fixed on the day of the Meeting by the Official Handicappers of the Royal Aero Club, viz.:—

R. J. G. Crouch.
J. D. Coales.
J. H. Ledebour.

Members of the Royal Aero Club will be admitted free on presentation of their Membership cards.

The prices of admission are as follows:—5s. (plus tax 9d.), 2s. 6d. (plus tax 6d.) and 1s. (plus tax 3d.).

The charge for motor-cars is 2s. 6d. (instead of 5s., as previously announced), and motor-cycles 1s.

Programme

Club Handicap.—For all types of machines. Two laps of the circuit. Distance, approximately 16 miles.

Entrant.

Machine, Engine and Pilot.

Fl.-Lt. W. H. Longton, Martinsyde F.4, 300 h.p. Hispano Suiza (W. H. Longton).
D.F.C., A.F.C.
Maj. J. R. Grant (Aircraft Disposal Depot) D.H.9A, 400 h.p. Liberty (R. H. Stocken).

Maj. J. R. Grant (Aircraft Disposal Depot) Parnell Panther, 200 h.p. B.R.2 (A. F. Muir).

Fl.-Cadet N. Vintcent .. B.E.2B, 90 h.p. R.A.F. (N. Vintcent).

De Havilland Aircraft Co., Ltd. D.H.9B, 230 h.p. Siddeley Puma (C. D. Barnard).

Dr. E. D. Whitehead Reid D.H.6, 90 h.p. R.A.F. (E. D. W. Reid).

Henry Petre .. Avro, 110 h.p. Le Rhone (H. Petre).

C. Dudley Palmer .. Avro, 110 h.p. Le Rhone (C. Dudley Palmer).

Fl.-Officer A. F. Ingram.. Avro, 110 h.p. Le Rhone (A. F. Ingram).

Bristol Aeroplane Co., Ltd. Bristol Monoplane, 100 h.p. "Bristol" Lucifer (C. F. Uwins).

Fl.-Lt. H. O. Long .. Martinsyde F.4, 300 h.p. Hispano Suiza (H. O. Long).

Fl.-Officer R. S. Carroll .. S.E.5A, 200 h.p. Wolseley Viper (R. S. Carroll).

2nd Waddon Handicap.—For machines with a speed of not less than 100 m.p.h. Four laps of the circuit. Distance, approximately 32 miles.

Entrant.

Fl.-Lt. W. H. Longton, Martinsyde F.4, 300 h.p. Hispano Suiza (W. H. Longton).

D.F.C., A.F.C. D.H.9A, 400 h.p. Liberty (R. H. Stocken).

Maj. J. R. Grant (Aircraft Disposal Depot) Parnell Panther, 200 h.p. B.R.2 (A. F. Muir).

De Havilland Aircraft Co., Ltd. D.H.9B, 230 h.p. Siddeley Puma (C. D. Barnard).

Bristol Aeroplane Co., Ltd. Bristol Monoplane, 100 h.p. "Bristol" Lucifer (C. F. Uwins).

Fl.-Lt. H. O. Long .. Martinsyde F.4, 300 h.p. Hispano Suiza (H. O. Long).

Fl.-Officer R. S. Carroll .. S.E.5A, 200 h.p. Wolseley Viper (R. S. Carroll).

2nd Croydon Handicap.—For machines with a speed of less than 100 m.p.h. Three laps of the circuit. Distance approximately 24 miles.

Entrant.

Vice-Admiral Mark Kerr, B.E.2E, 90 h.p. R.A.F. (Mark C.B., M.V.O. Kerr).

Dr. E. D. Whitehead Reid D.H.6, 90 h.p. R.A.F. (E. D. W. Reid).

Fl.-Cadet N. Vintcent .. Avro, 110 h.p. Le Rhone (N. Vintcent).

Henry Petre .. Avro, 110 h.p. Le Rhone (H. Petre).

C. Dudley Palmer .. Avro, 110 h.p. Le Rhone (C. Dudley Palmer).

1st Spring Handicap.—For machines occupying the first three places in the Waddon and Croydon Handicaps.

Four laps of the circuit. Distance, approximately 32 miles.

Parachute Descents.—Double Parachute Descent by W. Newell in a "Guardian Angel" Parachute.

Parachute Drop of a dummy man with "H" type "Guardian Angel" parachute, showing the use of a resistance parachute in a nose dive.

Exhibition of mail-dropping types of "Guardian Angel" Parachutes.

Balloon Sniping Competition.—Competitors:—Lieut.-Col. C. E. Risk, D.S.O., Capt. A. F. Muir, Flight-Cadet N. Vintcent and F. P. Rayham.

Three small balloons will be released at short intervals. The machine will carry a passenger whose object is to shoot down the balloons. An ordinary shot gun will be used, and the competitor who destroys the three balloons in the shortest time will be the winner.

How to reach Waddon Aerodrome, Croydon.—By train from London Bridge to Waddon.

By train from Victoria, Charing Cross and London Bridge to East Croydon and thence by tram or bus to the aerodrome.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

PERSONALS

Married

On January 31, at St. Thomas' Cathedral, Bombay, Flying Officer G. J. STROUD, M.B.E., R.A.F., was married to JANET MAY, only daughter of Mr. and Mrs. EDWIN BARTON WOODGATE, of High Halden, Kent.

To be Married

The engagement is announced between EVELYN JACK NEEDHAM, late Capt. 3rd Northamptonshire Regt. and R.F.C., elder son of the late Lieut.-Col. the Hon. H. Colville Needham and the Hon. Mrs. Needham, The Gate House, Windsor, and MARY CAMPBELL, only child of the late Rev. BENJAMIN CAMPBELL LITTLEWOOD and Mrs. LITTLEWOOD, Hillside, Bracknell, Berks.

The engagement is announced of Flying-Officer BERNARD LESLIE BLOFELD, R.A.F., third surviving son of Mr. and Mrs.

H. Blofeld of the "Woodlands," Sydenham Hill, and DOROTHY EVELYN FIRMIN, widow of J. E. Firmin, Lieut. 5th Batt., Wiltshire Regt., and eldest daughter of Mr. and Mrs. A. G. CHIFFEREL, of Inverleith, Denbigh Gardens, Richmond Hill.

Killed

DENYS NEWSON DICKSON, R.A.F., who died on March 23 as the result of a flying accident, was the younger son of Algernon and Edith Dickson, of Tower House, Woolton Hill, Newbury. He was aged 22 years.

Item

The will of Lieut. ANDREW BEAUCHAMP PROCTOR, V.C., D.S.O., M.C., D.F.C., of the Central Flying School, Upavon, Wilts, who died on June 21 last, the result of an accident while flying, has been proved at £945.

LONDON TERMINAL AERODROME

Monday Evening.
 April 10, 1922.

New British "Expresses" Scheduled

HANDLEY PAGE TRANSPORT began their new service to Paris on Tuesday. A machine is now timed to leave Croydon each morning at 10 a.m. and return from Paris at 3 p.m. The Instone Air Line have also put on a 10 a.m. service, and have altered the time of their midday service to 3 p.m. The Instone Air Line start operations on the London-Brussels service route on May 1, when they intend to run one machine in each direction daily, and I understand that the fare will be the same as last year—that is to say, £5.5s.

On Thursday tests with a new life-saving parachute were held above the aerodrome. The idea was to provide a parachute which would actually lift a pilot out of his seat in a aeroplane without his having to jump and fall some distance before the parachute opened. To attain this object a small parachute is first of all flung out, and this, opening in the rush of wind, drags the full-sized parachute from its housing. This in its turn opens, and lifts the pilot out of his seat.

Captain Muir, flying one of the Royal Aero Club "Avros," took up this apparatus, which was tried initially with a dummy. In order to prevent any fouling of the controls, should the apparatus fail to work, the dummy was placed on the wing rather than in the back seat of the machine. Two ascents were made, but, although it was shown that the idea would work, details of the release-gear require alteration before the dummy is replaced by a human being.

The Early-Morning Newspaper Service

THE Messageries Aériennes have been putting up an extremely good show with their aerial newspaper service, which is now scheduled for early each morning. Considering the state of the weather, the regularity obtained by this service has been reminiscent of the days of Aircraft Transport and Travel, and I understand that the various newspaper firms who are sending consignments have been very pleased indeed with results up to date. Mr. Grosfils, by the way, expects to have his Haymarket office open this week, and flew over to Paris on Tuesday in order to complete arrangements for certain schemes which the Messageries have in hand.

One of these projects is, I understand, to be an arrangement whereby a party of three or five people can, by paying the ordinary air-fare and giving a day or so's notice, have a special machine to leave at any time convenient to themselves. It is expected that there should be quite a demand for this facility, especially as there have already been several inquiries from ladies who wish to fly over to Paris and do a day's shopping, returning to London the same evening.

On Wednesday night tests were carried out on the lighting of the British section of the London-Paris airway. Temporary lights had been installed at the lighthouses at Tatsfield and Cranbrook, and the full lighting was in operation at the aerodromes of Croydon and Lympne. A Handley Page 0-400, belonging to the R.A.F., flew over from Biggin Hill, and, after making a landing at Croydon down the beam of a searchlight, ascended again and flew along the airway at Lympne. The "cone" light at Lympne was picked up long before the lighthouse at Cranbrook was lost sight of. The people on board remarked, in fact, that it was easier with these lights to follow the route at night than by day. After crossing the Channel the machine returned to Croydon,



LONDON-PARIS MACHINES COLLIDE

ON Friday of last week an extremely regrettable and most unusual accident marred the running of the London Continental Air Service, which has hitherto been remarkably free from serious disasters. It is an accident, also, all the more unfortunate in that it involved the recently inaugurated Daimler Hire Service. A Goliath belonging to Grands Express—F-GEAD—piloted by M. Mire and carrying a mechanic and three passengers had left Le Bourget at 12.6 p.m. for Croydon. The weather was very misty and visibility bad, and when flying over Thieuloy, near Grandvilliers, at a height of only a few hundred feet, a D.H. 18, from Croydon—G-EAWO—of the Daimler Service, piloted by R. E. Duke and carrying a boy steward and mails, suddenly loomed out of the mist. Before either pilot could turn, the machines collided, and then crashed to earth in flames. The D.H. 18, it is stated, had its wing and tail broken off by the impact and fell immediately, whilst the Goliath swooped to earth a little further off. Assistance was at once rushed to the wrecked machines, but with the exception of the boy steward—Hesterman—who was terribly injured, all were found to be

circled round the aerodrome, and then returned to Biggin Hill.

I understand, incidentally, that the wireless on this particular Service Handley Page was so much below the civil aviation standard that the wireless operator at Croydon was unable to get into satisfactory communication with the machine.

Night-Flight with a "Goliath" from Paris

THE Grands Express "Goliath," equipped for night flying is, weather permitting, to make an attempt at a night flight from Paris to London tomorrow (Tuesday) night. M. Labouchere will pilot the machine.

This "air express" is the only foreign machine employed on the "airways" which is fitted with wireless, but its installation has, so far, been unsatisfactory. There seems to be some mysterious reason why foreign companies are unable to obtain the same apparatus the British companies use, and which is most satisfactory.

While on the subject of wireless, it is interesting to hear that a private message, sent from a passenger in an "air express" over the Channel to his office in the City, was actually received in that office only one minute after it had been dispatched from the "air express" by wireless.

On Tuesday Mr. Alan J. Cobham arrived from Stag Lane to take the Instone D.H. 34 back for finishing touches and minor adjustments.

Mr. Cobham tells me that the De Havilland Aircraft Company have now a fleet of six D.H. 9 c's, which are available for "taxi" work, and that they are also prepared to accept pupils for training as pilots. Already they have had a number of ex-Service pilots to take "refresher" courses, which consist of an hour's "dual" on a D.H. 6, followed by "dual" and "solo" on a D.H. 9.

The Cup which Messrs. Napier presented for competition for inter-section football was received on the aerodrome on Saturday, and is now on view in the Post Office. The Instone team won this trophy last year.

Mr. Saul, who has been navigation officer on the aerodrome for some time, has left to join a new service which Daimler Hire, Ltd., are commencing. They intend to run a fleet of motor-yachts in a similar manner to their fleet of cars—their motto, apparently, being, "Land, sea, or air, Daimler Hire will get you there."

The Schoolboys and their Air Trip

THE 24 Harrogate schoolboys who were to have travelled by air to Paris on Saturday were prevented from flying by bad weather, and had to go by train and boat. They were so disappointed that, after a hasty consultation, it was arranged that on their way back from their Continental tour on April 25, they should fly from Paris to London.

On Tuesday, when the new 10 a.m. services of Handley Page and Instone were started, two D.H. 18s, one operated by each firm, left the aerodrome within two minutes of one another, and, aided by a following wind, sped at a great pace to Paris.

They were reported over Lympne only 35 minutes after leaving Croydon, and less than 10 minutes later a wireless message from one of them reported passing Boulogne. The last machine to start actually gained on its rival, arriving at Le Bourget only one minute behind it, having accomplished the journey in 1 hour 59 minutes.



LONDON-PARIS MACHINES COLLIDE

dead. The boy was taken immediately to the village, but died from his injuries some time later.

R. E. Duke was a well-known pilot of the Continental services, and had a distinguished war record in the R.A.F. He was formerly, before joining the Daimler service, with the Aircraft Transport and Travel Co. and the Royal Dutch Aviation Co. M. Mire, the French pilot, was also well known as a Continental Air Service pilot, and had been flying for Grands Express for over a year.

The following message of condolence has been sent by the Secretary of State for Air to M. Laurent Eynac, French Under-Secretary of State for Air, and to the Chairman of Daimler Hire, Ltd.:

"In my own name and that of the Air Council I offer you my deep sympathy on the fatal air collision which occurred yesterday, the only accident of this kind in the history of air transport between Great Britain and France."

(Signed) **FREDERICK GUEST,**
 Secretary of State for Air."

THE ROUND-THE-WORLD ATTEMPT

Sir Ross Smith's Proposed Route

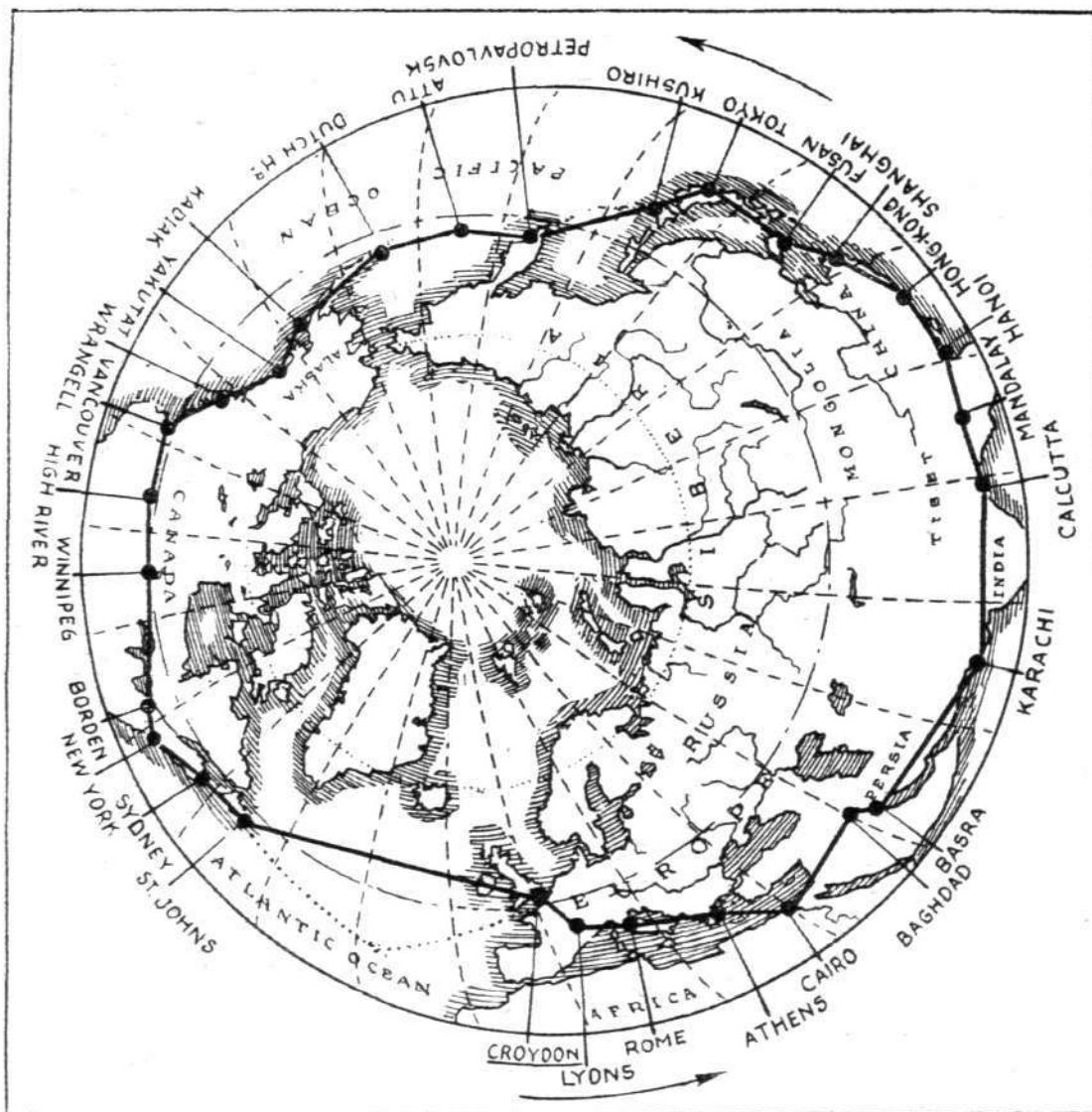
It is now some time since the first announcement was made of the intention of Sir Ross and Sir Keith Smith to attempt the flight around the world. In the interval plans have matured, and the machine, a Vickers "Viking" Amphibian, Napier "Lion" engine, has been finished and tested. Needless to say, there are numerous preparations to be made before such a flight can be attempted, and it has been necessary to postpone the start until some time this month. All being well, it is hoped that a start may be made from Croydon on Tuesday, April 25, but a good deal will, of course, depend upon weather conditions and other factors affecting the flight.

It is not the intention of Sir Ross to attempt to beat Phineas Fogg, Jules Verne's hero of "Round the World in Eighty Days," although with a fair amount of luck this should be possible. It is hoped, however, to make the tour,

operator. Lieut. Bennett will, as before, look after the machine and engine, and one is thus assured that both will receive the very best attention. We understand that in order the better to fit himself for his responsible duties Sir Keith Smith has been undergoing a course at Biggin Hill, and that he is now well qualified to navigate the machine on its epoch making flight.

Among the instruments carried on the flight will be a very fine photographic equipment, and both cinematograph and "still" pictures will be taken *en route*. Thus it is hoped that a pictorial record of very considerable value will be obtained to supplement the account of the tour.

As regards the machine, this, as already stated, will be one of the Vickers "Vikings," with 450 h.p. Napier "Lion" engine. A very similar machine was illustrated and described



SKETCH MAP OF SIR ROSS SMITH'S PROPOSED ROUTE: This map has been drawn from a globe, and gives a very good idea of the manner in which it is proposed to circle around the earth. By turning the map around, the names of the various ports of call are very conveniently read. No attempt has been made to show the actual path followed by the machine, the different points being linked up by lines which are straight in the map, but which, if followed, would, of course, result in curved paths.

which will be approximately 22,000 miles in length, in about three months, and in order to ensure fitness both of machine, engine and crew, it is intended to limit flying to approximately six hours per day, with every fourth day or so, according to circumstances, set aside for rest. In the case of the crew this rest will probably take the form of strenuous work on machine and engine, but it has often been stated that a change of occupation is as good as a rest, so that going on that assumption everything should work out satisfactorily. In any case, both Sir Ross and Sir Keith, and Lieut. Bennett, who accompanied them on the flight to Australia, have proved themselves capable of standing the strain, and there is every reason to hope that they will be able to do so again on this occasion.

As on the previous great flight, Sir Ross Smith will pilot the machine, while Sir Keith will act as navigator and wireless

in detail in our issue of October 6, 1921. There is thus little need to go into details here, and it suffices to indicate briefly the main points in the design. The machine is of the flying boat type, built as regards the hull of a light framework of rock elm covered with "Consuta" ply-wood. The wings are of the biplane type, with the Napier "Lion" mounted high in the gap between them, driving a pusher airscrew. The tail is also of the biplane type, which is a feature peculiar to most Vickers machines of Mr. Pierson's design. The "amphibian" gear consists of two wheels so mounted that they can be raised clear of the water by travelling up quadrants mounted on the sides of the hull. The petrol is carried in tanks in the boat, and is forced to a gravity tank in the top plane. For the trans-Atlantic portion of the flight an extra supply of petrol will be carried, and it is hoped to cross in about 18 hours if weather conditions are favourable. If not,

probably the southern route *via* the Azores will be taken which, although longer, does not involve quite so long non-stop flights.

The route which it is proposed to follow is shown in the accompanying map. Starting from Croydon, the machine will cross the Channel and proceed down through France, probably stopping at Lyons for the night. The next stage will be to Italy, probably Rome, whence the machine will cross to Greece. Cairo is to be the next port of call, and leaving here a course will be taken across the desert to Baghdad. Basra and Karachi come next, and flying across the upper part of India, Calcutta will be the next port of call. Leaving Calcutta the machine will cross Burma to Mandalay, and hence it will proceed to Hanoi in French Indo China. Hong Kong, Shanghai and Fusan (the latter in Korea) will be reached next, and the adventurous travellers will then cross to Japan. From here a course will be laid for Petropavlovsk in Kamchatka.

The next stage will include fairly long distances across the sea, the machine following the curve of the Aleutian Islands rather than attempting to shorten the sea route by going farther north into the Bering Strait. It is expected to make stops at Attu and Dutch Harbour in these islands, and Alaska will be reached *via* Kadiak Island. The mainland will be made at Yakutat, on the coast of Alaska, and the travellers will thence commence their journey across Canada *via* Fort Wrangell, Vancouver, High River, Winnipeg, and the great lakes to Borden and New York. After a stay at New York

◆ ◆ ◆ ◆ ◆ THE ROYAL AIR FORCE STAFF COLLEGE

THE Royal Air Force Staff College, Andover, Hants, which is commanded by Air-Commandore H. R. M. Brooke-Popham, was officially opened on April 4. The Chief of the Air Staff, Air-Marshal Sir H. M. Trenchard, had intended to perform the ceremony, but he was unable to attend, owing to other urgent official duties, and his place was taken by Air Vice-Marshal Sir J. M. Salmond, A.O.C., Inland Area, R.A.F., who read the inaugural address on behalf of Sir Hugh Trenchard.

There were present at the opening, in addition to the Commandant, staff and pupils of the first course, the following senior officers of the Royal Air Force : Air Vice-Marshal A. V. Vyvyan, A.O.C., Coastal Area, R.A.F.; Air Vice-Marshal P. W. Game, Director of Training and Organisation, Air Ministry; Air Commodore F. R. Scarlett, A.O.C., R.A.F., Halton; Air Commodore J. M. Sterle, Director of Operations and Intelligence, Air Ministry; Group Captain T. C. R. Higgins, Commanding No. 7 Group, Inland Area, R.A.F.; Mr. W. F. Nicholson, Secretary to the Air Ministry; and Mr. W. A. Bland, Deputy-Secretary, were also present.

In the opening remarks of his address, Sir Hugh Trenchard expressed his pleasure that they had reached the day of the opening of the Staff College—"the cradle of our brain." It was a great day for the Royal Air Force, especially, looking back at the formation of the Central Flying School with its Naval and Military wings, and then looking at the present work of the Air Service as a whole.

"Our relations," he proceeded, "with the older Services, have now been defined, as you have seen, by the Government in the House of Commons, for all to read. The integrity of the Air Service is assured, and though our relations with the Navy are still under discussion, I want all officers and men to realise how much the two older Services want to help us, and we must put aside from our minds, any idea that we are omnipotent and that we, and we alone, are the people that cannot be argued with. For practical purposes of the defence of the Empire, the three Services are really one Service, and all of you must realise that, whatever happens, whatever discussions arise, it is all three that will defend this Empire. In some cases, one will play a major part, sometimes another. In some, all will play an equal part."

He next touched upon the importance of all instructors and officers observing the strictest secrecy as to the confidential matters of policy it will be their business to discuss, and it was, for every one of them, to remember that the honour of the College was in their keeping. "Never," he said "abuse this confidence, and never allow confidential or secret matters to escape from the circle of your comrades."

"Remember," he continued, "that the one great thing to which you should, at all times, apply your thoughts and brains, is the expansion of the power of material and personnel without increasing either. . . . What you have to weigh, and weigh carefully, is the balance between cost and efficiency. If efficiency is equal in each case, which is the more economical ?"

it is the intention to start on the longest single stage of the journey, *i.e.*, across the Atlantic. If weather conditions permit the direct route, *via* Sydney and St. Johns, Newfoundland, will be attempted. If not, it is possible that the southern route, *via* the Azores and Portugal, may be chosen. In any case this portion of the route will present difficulties in the way of a long non-stop flight, although in other respects it may be less difficult by far than some of the other stretches that have to be negotiated.

The task is a difficult one, and a great variety of geographical and climatic conditions will be met with. Thus the flight will be a very severe test both of men, machine and engine. However, there is reason to suppose that, given a reasonable amount of luck, the flight will be completed. It is difficult, but certainly not fantastic, and it cannot but do a great deal of good as a piece of propaganda. That Sir Ross Smith has chosen the right type of craft for the attempt is quite evident. In fact, we should be inclined to say that no machine but an amphibian would have much chance of getting through. Certain of the ports of call require a landing to be made, and would thus rule out the pure seaplane. Others, and perhaps the majority, call for alighting on water, and rule out the land machine. By combining the two, although this means carrying a certain amount of extra weight, there is a good possibility of being able to alight safely anywhere *en route*, and thus the chances of success are considerably enhanced. We are certain all our readers will join us in wishing the aviators *bon voyage*.

"I very often hear of officers saying "My squadron is more efficient than so-and-so's squadron," but seldom did I, in the old days, hear of an officer saying "My squadron is as efficient as so-and-so's squadron, but I run mine at half the cost in petrol and tyres and machines." It is from that point of view that I want every officer to approach the question, to procure a maximum of efficiency at a minimum of cost, and to take a pride in the result as they do in economy in their homes." . . . "I do not want you to think that efficiency is not still an important factor, but I do want you to have it constantly in mind, that economy is as great a factor."

The war-like conditions take a long while to die, but by degrees, both officers and men throughout the Air Force, must be taught to encourage economy in their own interests, and each unit must realise that, by being more economical than any other unit, they are benefiting the Air Force as a whole."

Touching upon the development of the Air, not in substitution for other forms of defence, but to meet new forms of attack, which, for the British Empire, is really the vital question, Sir Hugh Trenchard said he hoped it would be possible for Air Commodore Brooke-Popham to get Naval and Military officers to come and give their views on this subject, so that it may be studied as a whole and not in water-tight compartments.

On the question of the Air, as an auxiliary to the Army and Navy, he said that he knew that the two older Services only wanted to help the Air Force, and that they looked, with a single eye, to the defence of the Empire as a whole.

"In the same way, we know they would help us to solve our problems, so we, on our side, must do our utmost to help them in solving theirs."

Coming to the question of our Reserves, Sir Hugh said, "It is impossible in peace time, to maintain a force big enough for any eventualities, nor should it be necessary. Therefore, we have three types of Reserve, the first being the people who, in the ordinary way, pass out of the Air Force into the Regular Reserve. Secondly, a form of Auxiliary Air Force, acting as the Territorial Force does towards the Army; and I foresee that this will be a most important force for the defence of these islands in time to come, and by its means, I hope that, the knowledge of the advantages of aviation will spread to our civil population. Thirdly, we have civil aviation. We must look to the civil aviation that is developing, or may be developed, in the future for a Reserve. If a large number of machines and pilots can do useful commercial work in their civil capacity, they will be of inestimable value as a Reserve for war."

Having dealt with some of the wider aspects, Sir Hugh Trenchard turned to matters of a less general character, in which he gave, to instructors and pupils alike, some very sound and helpful advice, concluding his admirable address by saying "the setting up of the Staff College is a signpost, and on the signpost are the words to EFFICIENCY, ECONOMY and FORESIGHT."

AERODYNAMICAL EFFICIENCY AND THE REDUCTION OF AIR TRANSPORT COSTS*

By M. LOUIS BREGUET.

THE possibility for aeroplanes used in air transport services to be made to pay has, so far, been very often questioned, considering the present cost price per ton-mile flown.

I intend to demonstrate that one can, from now, predict an important reduction in air freight rates, not only through greater safety of flight, mainly resulting from a longer life of aeroplanes and engines, but also through the betterment of several coefficients which characterise the aerodynamical qualities of aeroplanes.

The study of these coefficients can be made either by laboratory tests on models or by full-scale tests in flight, which, if judiciously interpreted, should yield information sufficiently accurate for practical purposes. I am of opinion that these full-scale tests have not been given yet all the attention and extension they deserve. I read a paper on that subject at the last international Air Navigation Congress which was held in Paris last November.

May I remind you that the principles of aerodynamics lie in the following formulæ:—

$$R_x = (K_x + \sigma/S)SV^2 \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

wherein:—

R_x is the total drag of the whole aeroplane along the direction of motion.

K_x is a coefficient relating to R_x and dependent upon the value of the angle of incidence in flight.

σ is the projected area, normally to the direction of motion, representing the passive resistances of the aeroplane.

S is the projected area of the wings on a plane parallel to the direction of motion.

V is the speed of the aeroplane along the trajectory.

$$R_y = K_y SV^2 \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

wherein:—

R_y is the lift of the aeroplane, normal to the direction of motion.

K_y is a coefficient relating to R_y and dependent upon the value of the angle of incidence in flight.

Dividing equation No. (1) by equation No. (2), which gives the ratio of drag to lift, we have:—

$$R_x/R_y = (K_x + \sigma/S)/K_y = \tan \phi \quad \dots \quad \dots \quad \dots \quad (3)$$

That expression $\tan \phi$ is usually called the "fineness" of the aeroplane, and every aeroplane is characterised by a certain minimum value of $\tan \phi$ which can be represented by $\tan \phi_m$. The smaller $\tan \phi_m$ is the better will be the aerodynamical qualities of the aeroplane.

We will now consider the formula giving the longest distance which a given aeroplane can fly in a "no wind" atmosphere (which formula I established during the war).

$$L = (622 \rho/m \tan \phi_m) \log P/(P - p) \quad \dots \quad \dots \quad (4)$$

wherein:—

L is the said longest distance in kilometres.

ρ is the efficiency of the propeller.

m is the "fuel and oil" consumption of the engine per horse-power and per hour in kilogs.

P is the total weight in kilogs. of the aeroplane and cargoes at the start.

p is the weight in kilogs. of the "fuel and oil" consumed by the engine during the flight and which was included in P .

One at once realises the very great importance of the fineness $\tan \phi_m$ which is the only term depending upon the aerodynamical qualities of the aeroplane.

For certain given values of L , ρ , m and P , a reduction of $\tan \phi_m$ causes a reduction in the "fuel and oil" consumption, and consequently increases the weight of paying freight which could be carried.

The conclusion is that one must bring to the minimum the value of $\tan \phi_m$. It can be obtained by choosing the best possible profile for the wings, the best designs for the body, empennage, etc. Moreover, the undercarriage should be made to disappear inside the body or the wings when the aeroplane is in flight, etc.

The power spent in horizontal flight is given by the formula:—

$$W = R_x V = (K_x + \sigma/S) SV^2 \quad \dots \quad \dots \quad \dots \quad (5)$$

where

W is the power in kilogs.

* Paper read before The Royal Aeronautical Society, April 6, 1922.

R_x is the drag in kilogs. as calculated by formula (1). S is the wing area in sq. m.

V is the speed in metres per sec.

On another side, the value of the lift, as given by formula (2), is equal to the total weight P of the aeroplane in horizontal flight. We thus have:—

$$P = R_y = K_y SV^2 \quad \dots \quad \dots \quad \dots \quad \dots \quad (6)$$

Eliminating the speed V between the two equations (5) and (6) we come to the formula giving the power W :—

$$W = P\sqrt{(P/S)(K_x + \sigma/S)/(K_y)^{3/2}} \quad \dots \quad \dots \quad (7)$$

We thus see that the necessary power is in direct proportion to the value of the term

$$(K_x + \sigma/S)/(K_y)^{3/2}$$

I have represented the term by the Greek letter ξ and call it the *coefficient of power*.

For a given aeroplane, the value of ξ will reach a minimum for a certain angle of incidence in flight, and to that particular value of ξ will correspond the minimum of power required, and that is why I propose to call that special value ξ_m the *coefficient of minimum power*.

That coefficient of minimum power can be used to calculate the minimum power necessary to maintain in horizontal flight, a given aeroplane, and the height of ceiling chosen will fix the margin of power to be provided. One can, therefore, see that, should it be possible to reduce in the proportion of two to one, for instance, the value of ξ_m , then an engine of half the power would be sufficient to reach the same ceiling, and here, again, we come to the conclusion that the aerodynamical qualities of the aeroplane must be improved as much as possible.

I am now going to show you how one can design in the near future, starting from existing aeroplanes, new ones which should bring down the rate of aerial freight to the value of those now charged in France for first-class railway passengers.

An aeroplane of high standard quality now has:—

A fineness equal to 0.12

Its coefficient of minimum power is equal to 0.55

Its propeller efficiency is 0.73

Fuel and oil consumption of its engine at an altitude of 2,000 m. is 290 gr. per horse-power and per hour.

We will, moreover, admit the total weight of that aeroplane to be such as to allow it to climb to 4,500 m. within $1\frac{1}{2}$ hours, and we will consider an aerial line of 800 km. non-stop flights.

If such an aeroplane has a wing surface of 100 sq. m., for instance, and a power plant of 600 h.p., its dead weight will be equal to 2,200 kilogs., and it will be able to carry a total load of 2,100 kilogs. Its total weight will thus be equal to 4,300 kilogs.

Its flying speed at full power, at an altitude of 2,000 m., will reach 175 km. an hour, and its commercial speed at the same altitude can be reckoned as to be equal to 150 or 155 km. an hour.

The weight of fuel and oil necessary in a still atmosphere, for a given flight, is deduced from the formula (4), which in the present case, gives the weight as being 568 kilogs.

But practical flying has proved that one must expect to have to fly against a 50 km.-an-hour wind, and, therefore, it is necessary to have at least a 50 per cent. safety margin in fuel and oil. In other words, we shall have to carry in the case under consideration a total weight of fuel and oil equal to $568 \times 1.5 = 850$ kilogs., whilst the average consumption will only be of about 1.1 times the calculated quantity of 568 kilogs., that is to say, 625 kilogs.[†]

The crew (pilot and second pilot-mechanic) together represent a weight of about 180 kilogs., and another 70 kilogs. are necessary for various instruments and T.S.F. apparatus.

The total weight of fuel and oil, crew and instruments, thus reaches 1,100 kilogs., leaving a clear margin of 1,000 kilogs. for passengers and paying cargo.

† The coefficient 1.1 is the average of data registered on several hundred flights.

The present running costs of an aerial line of 800 km. long, with the above aeroplanes, are as follows :—

	Francs.
Petrol (820 litres at 1.82 francs for 800 km. flown per km.)	1.87
Oil (50 litres at 3 francs for 800 km. flown)	0.19
Crew (pilot at 0.20 francs per km., second pilot-mechanic at 0.15 francs)*	0.35
Sinking fund for aeroplane and engine	6.50
Upkeep of aeroplane and engine, and aeroport expenses, etc.	4.50
General expenses of the company	4.00
	Francs 17.41

Should an aeroplane always fly with full cargo load, and without incident or interruption, the cost price per ton and per kilometre would thus be about 17.40 francs. But one has to reckon with trips made with smaller paying loads, or incidentally interrupted, and, therefore, it is wise to calculate the cost price per ton on flights with half cargo loads as an average, which brings the present cost price per ton and per kilometre to 35 francs. That is the price at which are now working the best aerial lines.

Should such prices be considered as irreducible, they would be practically prohibitive, and little chance would be left to commercial aviation, since one would have to charge from 1,100 to 1,200 francs per passenger from Paris to London or *vice versa*, without any profit to the company.

How can these figures be reduced in the near future? We will consider :—

1. Advantages to be drawn solely from the betterment of aerodynamical qualities of the aeroplanes and of the thermal efficiency of engines.

2. Advantages resulting from such improvements in the engines and in mechanical parts of aeroplanes as would bring reductions in the provision for sinking funds, upkeep of machines and general expenses.

1.—Advantages to be drawn solely from the betterment of aerodynamical qualities of the aeroplanes and of the thermal efficiency of engines.

Taking, for the sake of demonstration, the same size of aeroplane as already considered, that is to say :—

Wing area: 100 sq. m.

Total weight: 4,300 kilogs. at the start.

Ceiling: 4,500 m.

And if we suppose that we can bring down :—

Its fineness to	0.065 instead of 0.12
Its coefficient of minimum power to	0.28
Its propeller efficiency to	0.775
The fuel and oil consumption of its engines per horse-power and per hour to	215
	290 gr.

then such an aeroplane will not require more than 288 h.p. to reach the same ceiling of 4,500 m.

It is evident that the reduction in power is only due to the betterment of the fineness and of the efficiency of the propeller.

One can thus spare 312 h.p., which means a saving of 468 kilogs. of dead weight (at the rate of 1½ kilogs. per h.p. for the engine and its appliances).

The quantity of fuel and oil to be carried can be deduced from the formula (4), as has already been done for the first type of aeroplane considered. This gives

$p = 230$ kilogs.

The weight it is wise to carry up will be taken equal to $230 \times 1.5 = 345$ kilogs.

and the average actual consumption will be about

$230 \times 1.1 = 255$ kilogs.

The weight saved on fuel and oil with the second type of aeroplane will thus be practically

$850 - 345 = 505$ kilogs.

and the excess of useful load is thus increased to a total of

$468 + 505 = 973$ kilogs.

The commercial efficiency of that type of aeroplane will thus be practically double that of the first type, since it

* Several companies now have to spend an average of 0.50 francs per kilometre for the crew, but that is because their lines are rather short ones (say, 375 km. on Paris-London), and also that the crew only flies one single trip a day, and not every day. With the present minimum of salary one has to guarantee them, as also with the number of pilots one has to keep according to subsidies-regulations, these pilots are far from rendering efficient work (from "distances flown" point of view). The figures I have taken of 0.35 francs apply to lines of some 800 km., a few of which are now in contemplation.

will be able to carry 1,973 kilogs. of passengers or paying freight, instead of 1,000 kilogs.†

At the same time, that aeroplane will cost 25 per cent. less than the first, since its power plant will only be half the size of the first, and the value of the power plant now represents about half the price of an aeroplane.

The running cost of the new type of machine will then be as follows :—

	Francs.
Petrol (335 litres at 1.82 francs for 800 km.) per km.	0.765
Oil (20 litres at 3 francs for 800 km.)	0.075
Crew	0.35
Sinking fund (75 per cent. of 6.50 francs, since the cost price of the aeroplane has been found reduced in that proportion)	4.90
Upkeep of aeroplane and engine and aeroport expenses	4.50
General expenses of the company	4.00
	Francs 14.59

As the paying load has been raised to 1,973 kilogs., the cost price per ton and per kilometre, becomes equal to 7.40 francs, or—if calculated on a half cargo load basis—14.80 francs, instead of the present cost price of 35 francs. London to Paris passenger fares can then be brought down to some 450 or 500 francs, without profit for the company. Although very high, these last figures are more encouraging and nearly workable.

2.—Advantages resulting from such improvements in the engines and in mechanical parts of aeroplanes as could bring reduction in the provisions for sinking funds, upkeep and general expenses.

When one can rely on an average life of 1,000 hours for aeroplanes and engines, instead of the present 200 or 250, much better prices will be obtained. Supposing that such an aeroplane be bought for the same price as the last one mentioned, but calculating on 1,000 hours life, the sinking fund only calls for 1.10 francs, whilst the upkeep can be reasonably considered as half as expensive, since the aeroplanes and engines will be of much better quality and strength. General expenses will also be considerably reduced through the much larger turnover that the companies will then be able to secure.

	per kilometre, francs
Petrol	0.765
Oil	0.075
Crew	0.35
Sinking fund	1.10
Upkeeping	2.25
General expenses	1.00
	Francs 5.54

That is to say, 5.55 francs for 1,973 kilogs. carried, or 2.82 francs per ton and per kilometre, or 5.65 francs if calculated on the usual half cargo load basis. Then the Paris to London fare will become about 190 francs, or say £4.

When that time comes, then the aerial transport companies will be flourishing paying concerns, and no more subsidies will be required from the State, because the time spared in travelling by air from Paris to London, for instance, will certainly be worth a fare of, say, £6.

It is worth noting, in the last cost price we have given, that fuel and oil, although intrinsically very expensive, amount only to 15 per cent. of the total cost price, whilst the crew draws 6.4 per cent.

On the other side, sinking fund, upkeep and general expenses, which, on the present cost of 35 francs, represent 86 per cent. of the total cost price, have grown to 92 per cent. with the second example, and come down to 78 per cent. in the last considered circumstances.

May I, therefore, state—in opposition to the sayings and writings of certain experts who do not know much about aerial transports—that it is not the cost of fuel or crew which makes aeroplanes expensive machines, but only their present short life, with resulting consequences. But we must expect and hope to see large and strong aeroplanes of the future become as safe as motor cars, steamships and railways, and when that time comes, then we will be able to apply to sinking funds the same coefficient as is now used for steamships, that is to say, an average life of twenty-five years!

† As a matter of fact, one should deduct from that weight some 180 to 200 kilogs., for the accommodation of the surplus of passengers and freight. But on another side, one can reasonably expect that the daily progress made in the manufacture of aeroplanes and the use of stronger material will allow saving on dead weight of practically the same amount.

From the example I have taken for the purpose of demonstration, of an aeroplane of 100 sq. m. wing area and 4,300 kilogs. total weight, you must not infer that I expect the improvements of aerodynamical qualities (with the consequences I drew from it) to be realised by such small machines. I believe one can build very good aeroplanes of 4 to 5 tons total weight; but I think it would be much nearer to reality to talk of 500 sq. m. wing surface, 20 to 40 tons total weight and 1,500 to 4,000 h.p. Such large machines will, most probably, have very thick wings. By thick, I mean about 6 ft., and within these wings will be provided cabins, saloons and every comfort for passengers. It is worth noting that if a large increase of the size of an aeroplane does not improve materially its commercial efficiency, it has, nevertheless, the great advantage of allowing much more room for passengers and freight, and that can be easily understood when one remembers that whilst the weight, the power, the capacity in cargo and the cost price of an aeroplane vary as the square of its lineal dimensions, the volume to be reserved for passengers will vary as the cube of the same dimensions. In other words, if the weight, surface and power have been increased 100 times, then the cubic capacity will be 1,000 times larger.

It is not exaggerated to talk of the days when the price of aerial transport will come down to 2 francs per ton and per kilometre, since an average life of two or three years—

or say 2,000 hours of flight—for aeroplanes and engines would suffice to bring that result, even with petrol and oil at their present very high prices. It is practically certain that aeroplanes of the future will not burn petrol but rather heavy oils or other cheap fuels, the cost price of which should be about one-fifth that of petrol.

Now, first-class passenger fares in France are calculated on the basis of 21.15 francs per 100 km. Supposing that a passenger with his hand luggage weighs an average of 90 kilogs., we find that the ton-kilometre (passenger) runs to 2.35 francs. That shows that the future prices of aerial transports will be of the same order as the present first-class passenger fares in France.

More striking still is the comparison with the fares on steamship lines, since a first class passenger nowadays pays about 6 francs per ton-kilometre, whilst state cabins are charged at the rate of 10 francs.

In conclusion, aerial transports are expensive for the present, because they are not yet out of the experimental stage, and that the sinking funds, the upkeep and general expenses are very heavy; but one can reasonably say, that within 10 years, these costs should be reduced in the proportion of seven to one, and within 20 years in the proportion of fifteen to one.

We must therefore work hard and steadily, with full confidence in the future of aviation.



A WAR RECORD OF

In a summary of statistics of the Zeppelins and other airships employed by the German Navy during the war, published in the *Marine Rundschau*, the facts concerning these aircraft are available for the first time. Included, *The Times* Berlin correspondent states, is a complete list of naval airships, with the names of their commanders and watch officers, the date of their being put into service, the number of cruises and attacks made, their airport stations, and a brief account of their ultimate fate.

From first to last the German Navy had at its disposal 78 airships. Six were either air training-ships or were used for special purposes, so that 72 took part in actual scouting and operations. The figures show that the average for each vessel was 16 cruises and three attacks. The maximum number in commission at any one time was 19. The highest number in commission in a single year was 39 in 1917, but the greatest number of cruises and attacks was made in 1916. In that year the 31 airships in commission at various times made 296 cruises and 107 attacks. But it was also the year of the greatest losses. Eight were destroyed by enemy action, four by storm, and four by explosion. In the following year nine were lost by enemy action, and five by storm. The total loss for the whole period of the war was 52, made up as follows—Destroyed by enemy action, 26; destroyed by storm, 14; destroyed by explosion, 12. Besides these, however, 17 others went out of service for various reasons.

Full particulars are given about the various stations. The double shed at Fuhlsbüttel was burnt down on September 16, 1916. That at Tondern was burnt out three times and rebuilt. Of the four double sheds at Ahlhorn, three were blown up and totally destroyed in the great explosion which took place on January 5, 1918.

Of the 52 airships lost, the crews of 19 were killed, the crews of six taken prisoners, and the crews of three were interned. In the case of the other 24 there was no loss of personnel. Nine airships were left in commission when the Armistice was declared, including the two school airships at Nordholz. One was in course of construction.

Of the six Zeppelins put into commission in 1914, L.3 and L.4 were stranded during the storm of February 17, 1915; L.5 was stranded at Dünamünde, in Courland, on August 6, 1915, after being hit by enemy fire; L.7 was shot down in flames by the enemy on May 4, 1916; L.6, the training-ship, exploded in its hangar on September 19, 1916; and L.8 was shot down in action of March 5, 1915, and stranded at Tirlemont. Twelve were put into commission in 1915. L.18, commissioned on November 3, 1915, caught fire in the hangar at Tondern a fortnight later while being inflated. L.9 blew up in the hangar at Fuhlsbüttel on September 19, 1916, and L.10 was struck by lightning above Neuwerk Island on September 3, 1915. Of the rest, L.12, L.15, and L.19 were shot down; L.17 blew up in the explosion at Tondern; L.20 was stranded at Stavanger, in Norway; L.11, L.13 and L.16 were dismantled, and only L.14, the training-ship, survived to be handed over at the Armistice.

Of the 1916 ships, L.21, L.22, L.23 (at sea), L.31, L.32, L.33 (over London), L.34 (over Sunderland), and L.39 (over

GERMANY'S AIRSHIPS

Compiègne), were shot down. L.24 caught fire while entering the hangar at Tondern, and caused the explosion which destroyed L.17. L.25 to L.29 were Army ships. L.30 and L.37 went out of commission in 1917, and were handed over to the Allies at the end of the war. L.36 and L.38 were stranded.

The 1917 ships suffered bad losses both from explosions and in action. The great explosion at Ahlhorn on January 5, 1918, accounted for L.46, L.47, L.51 and L.58, besides the Schutte-Lanz, SL.20; L.57, which had been intended for the expedition to German East Africa, exploded in mid-air on her trial trip on October 7, 1917, 14 days after completion. The entire crew perished, and the cause of the disaster was never discovered. She was succeeded by L.59, which made the trip, but was recalled when over the Sudan because the Germans had then evacuated German East Africa. This vessel bombed Naples, and was engaged in an expedition to bomb Malta when she came down in flames in the Straits of Otranto for reasons unknown, as she was not then under attack.

The following were destroyed in action:—L.43 (in the North Sea), L.44 (near Lunéville), L.45 (over Sisteron), L.48 (after bombing the Suffolk area, brought down by the R.F.C., with Commodore Schütte on board), L.49 (near Bourbonnes), L.50 (in France, afterwards sailed away without crew), L.53 (by a British airman while scouting), L.54 and L.60 (by a British airman while in the hangar at Tondern), and L.55 (over Tieffennort, in attack). L.40 was stranded at Nordholz aerodrome in foul weather. The others were either dismantled or were handed over at the Armistice.

The Zeppelin war had been a continuous struggle on the part of the Germans to attain altitudes that could not be reached by the defence. In the summer of 1917 they had reached altitudes at which human beings could not live without oxygen (afterwards compressed air was used). The type L.53 to L.55, then in use, had a cubic capacity of 56,000 cubic metres and a maximum altitude of 18,000 to 20,000 ft. But in 1918 they found their attacks badly hampered by British aeroplanes and the "excellently organised artillery" in England, and they were at best able to attack only in cloudy weather.

The L.70 was a new type, with seven motors and an altitude of 21,000 ft., whereby it was hoped to outstrip any defence. It set forth on August 6, 1918, with the Commodore, Captain Peter Straffer, on board, but the uncertain temperature of August night prevented it from attaining its maximum altitude, and it was shot down by British sea forces on August 10, 1918. On the following day the next in seniority, Captain Prölz, was brought down with L.53, and it was decided temporarily to abandon attacks till the new type, with a cubic capacity of 62,000 cubic metres and an altitude of 22,000 ft., was ready. Fortunately the German Navy mutinied and the German front collapsed before this was ready. L.71 was handed over with the other eight to the Allies, and L.72, still unfinished, was ultimately completed and surrendered to France.

Nine Schutte-Lanz, three Parsivals, and one other were commissioned. None of these, it is stated, proved satisfactory.

IN PARLIAMENT

Commercial Aviation Subsidies

MR. GILBERT, on March 30, asked the Secretary of State for Air whether his Department pay or allow any subsidies to any commercial aviation companies; if so, will he state to how many of such companies they are paid, what the amounts are, and if any and what conditions are imposed as a condition of payment; if any time limit is imposed; and, if so, for how long?

Captain Guest: As the answer is rather long, I will, with my hon. friend's permission, circulate it in the *Official Report*.

The following is the answer:

The answer to the first two parts of the question is as follows:—

Two companies are at present subsidised on the London-Paris route. The amount and conditions of this subsidy are set forth in Command Paper 1521, published in October last. The terms and agreements therein set forth have been extended to 31st March.

From the 1st April three companies will be subsidised on this route under new conditions. Briefly summarised, these conditions are as follows:—

(1) A subsidy of 25 per cent. on gross takings.

(2) Provision of not more than half the operating fleet by the Air Ministry on a hire purchase basis.

(3) An additional grant during the period ending 28th February, 1923, of £3 per passenger and 3d. per lb. of goods carried.

(4) A reduction in the subsidy by the amount of any profit over 15 per cent.

(5) In order to qualify for the subsidy, the firm, its personnel and aircraft, must be British, a specified regularity of service must be maintained, and fully detailed accounts must be kept for the information of the Air Ministry.

In regard to the third and fourth parts of this question, the arrangements in respect of the 25 per cent. subsidy and the provision of machines on the hire purchase basis hold good until 31st March, 1924. The provision of any additional grant under paragraph (3) above after 28th February, 1923, will be a matter for consideration prior to that date. I would add that tenders are now under consideration for the operation of the London-Brussels route by one company with the assistance of a subsidy.

Army and Air Force (Annual) Bill

WHEN considered in Committee, on April 5, Major-General Seely said he desired to raise a point which had been raised previously. That was, the great inconvenience of having the Army Act and the Air Force Act combined in one Bill. It would be very much better, for every reason, if they had separate Bills. There was no special relation between the Army and the Air Force, which does not exist as between the Air Force and the Royal Navy. In all sorts of ways, the terms of service of the Air Force were wholly different from the terms of service of the Army, and they were not differences in a small degree but differences in kind. All this had to be explained in various clauses.

In the case of the Air Force, a point of really high principle was involved. It was not only inconvenient, but a matter of high policy, not to confuse the Army and the Air Force. Each should have its own separate Annual Act. He asked whether an assurance could be given, that in future, two separate Bills would be provided.

Lieut.-Col. J. Ward, who spoke in a completely opposite direction, was followed by Mr. Mosley, who said Lieut.-Col. Ward, having had no connection of any kind with the problems of the air, saw fit to ridicule the suggestion of Maj.-Gen. Seely, who had had a long and intimate connection with the Air Service. Lieut.-Col. Ward did not appear to realise in what the duty of the Air Service consisted, or the kind of discipline that was required. In the Air Service, a man was kept for one of two things, either to fly, or to keep machines and engines in proper repair; he had not to polish buttons or to march about a barrack square. The very nature of his employment was fundamentally different in every respect from the employment of the ordinary military man, and the characteristics required differed widely from the kind of character which was desirable in military service. All that was required of the Air Service mechanic was mechanical proficiency?



NIGHT FLYING ON LONDON-PARIS ROUTE

THE first flight by night over the British portion of the Continental Air Route (Paris, Brussels, Amsterdam, etc.) was carried out on Wednesday night by an Air Ministry machine in order to test the ground organisation which has been established for commercial flying by night between London and the Continental capitals.

The aeroplane, which carried eight people, including a navigator, wireless officer, and the Air Ministry officials responsible for the lighting and wireless arrangements of the route, left Biggin Hill about 8.30 p.m., flew to the London Terminal Aerodrome, Croydon, and landed there. The pilot in charge, who has had great experience, expressed the view that the flood lighting arrangements on the aerodrome by means of dispersed searchlight beams, together with the illuminated landing "Ls," were the best he had seen, and made landing as easy by night as by day.

The aircraft left Croydon Aerodrome about 9.20 p.m., and steered a direct course for Lympne Aerodrome on the coast. Temporary aerial lighthouses were in action at Tatsfield and at Cranbrook, and these were easily picked up. Shortly after passing the Cranbrook light the pilotage light on Lympne

granted the ordinary measure of good conduct that was required in civilian life, and obedience to the exigencies of the Service. Military discipline was quite unsuitable, and in most respects, quite unnecessary, in regard to the problems of the Air Service. He, himself, having had a slight connection with the Air Service, must agree with Maj.-Gen. Seely.

Lieut.-Col. Ward: Would it not be more sensible to suggest that the Air Force should come under the civil authority and not under the Army?

Mr. Mosley: The Air Force was neither civil nor military. It was not subject to the ordinary requirements of military service. It was a service distinct, and altogether apart, from the Army or the Navy, or civilian life. It was a new arm. Why it should be shackled and tied by military traditions which were entirely unsuited to it, passed his understanding.

Captain Guest said this question had occupied the attention of the Air Ministry since he had been there, during the past year, and there had been considerable discussions as to whether the Service would be assisted by having its own Annual Act. There were many reasons why they should like to have their own Act. It would be a further hallmark of an independent and separate Service. Last year conditions were such that the Bill was not presented to the House. This year, the pressure of business had, to some extent, interfered with a decision being taken on the matter. He should, however, continue to press for a separate Air Force (Annual) Bill. What decision would be reached by the Cabinet it was not for him to say. Taking it all round, he thought that so much of their Service was common to both Services that it was not a matter which one need press, unduly, in the present state of public opinion, but he hoped that nothing had been said that day which would prevent the Air Ministry from raising this question on another occasion.

Maj.-Gen. Seely said he was glad to hear that the Secretary of State for Air had had this under consideration, and that it was proposed to bring in a separate Air Force Bill.

Question, "That the Clause stand part of the Bill," put, and agreed to.

Battleships and Bomb Attacks

REAR-ADmirAL SUETER, on April 5, asked the Parliamentary Secretary to the Admiralty whether he has any information that a 4,000 lbs. bomb has been dropped, quite successfully, from the air in America?

Mr. Amery: According to the American Press, a bomb of 4,300 lbs. carrying about 2,000 lbs. T.N.T., has been dropped on land by an army aeroplane. This is the only instance of which the Admiralty have any information.

Lieut.-Col. Moore-Brabazon: Can we have some experiments on this side, with regard to bomb dropping? Can we have the Hood for 10 minutes, against the Air Force?

Capt. Viscount Curzon: Is there a single aeroplane in any Navy in the world, operating from an aircraft carrier, which is capable of carrying bombs of such a size?

Mr. Amery: I believe not.

Rear-Admiral Sueter asked (1) whether the new designs for the post-Jutland battleships, as contemplated to be built in 1923, can resist a 4,000 lbs. bomb, when dropped from the air, within 30 ft. of the ship if fitted with a delay-action fuse for detonating the explosive charge when at about 20 ft. under water;

(2) whether any experiments have been carried out in this country to determine the effect of the water projectile thrown up by a 2,000-lb., 3,000-lb., or 4,000-lb. bomb, dropped from the air, to strike the water at various distances from a target representing the under-water portion of a post-Jutland battleship provided with an external bulge or other devices for lessening the explosive effect of a locomotive torpedo or bomb dropped from the air?

Mr. Amery: It is not in the public interest to give information with regard to experiments which have been, and are still being, carried out, but the Admiralty consider that satisfactory protection can be provided in the new ships against the attack suggested in these two questions.



LONDON-PARIS ROUTE

Aerodrome became clearly visible. The machine then flew over Lympne Aerodrome and continued over the Channel towards St. Inglevert, the first aerodrome on the French side. The marine lighthouse at Cap Gris Nez, which had been visible as soon as the aircraft was over Biggin Hill, gave an excellent leading mark, and very soon the French aerial lighthouse on St. Inglevert Aerodrome also came in sight. Turning back on its course, the aeroplane then crossed the coast near Folkestone, and headed direct for the pilotage light at Lympne, at which aerodrome an easy and smooth landing was effected. Leaving this station at about 11.30 p.m., a course was re-traced to Croydon, the lights of the Terminal Aerodrome being easily picked out from all the mass of lights of Croydon and London generally. After circling Croydon Aerodrome the aircraft was headed for Biggin Hill, where a landing was effected with the help of wing tip flares and ground flares.

The general impressions of those who made the flight were that it is easier to find a course by night than by day and that provided the Continental ground organisation is as good as our own there should be no difficulty whatever in commercial night flying over the London-Paris route.



The Flight to South America

As recorded in FLIGHT last week, the two Portuguese aviators who are attempting to fly from Portugal to South America in a Fairey seaplane, with Rolls-Royce "Eagle" engine, left Portugal and arrived safely at Las Palmas, Canary Islands, on March 30. They were then reported to have left Las Palmas for St. Vincent in the Cape Verde Islands on Sunday morning, April 2, but no news was to hand when going to press last week. It is now reported that the machine arrived safely at St. Vincent, where the aviators are remaining until a full moon will assist them in the 1,260 miles long stage

from St. Vincent to Fernando Noronha, off the coast of Brazil.

Parcels by Air to Paris

A REDUCED scale of charges is announced by the Postmaster-General for parcels accepted by the Post Office for conveyance by air and delivery in Paris. Under the old scale the charge varied between 1s. 6d. for a 1 lb. parcel and 9s. 9d. for the maximum weight of 11 lb. The new schedule is simplified, and the fees are as follows:—

Up to 2 lbs., 1s. 9d.; up to 5 lbs., 3s.; up to 8 lbs., 3s. 9d.; up to 11 lbs., 4s. 3d.

R.A.F. MEDITERRANEAN GROUP

THE R.A.F. have, we learn from the Air Commodore Commanding Mediterranean Group, been taking a prominent part in the sports and athletics in the island of Malta, and, considering their small number, when compared to the Navy and Army, they have shown up very creditably during March.

In polo the R.A.F., *versus* Royal Sussex Regt., were rather badly beaten by 5 goals to nil; but as this was only the second match that they had played as a team, no other result could be expected. In addition, one member of the side was very badly mounted.

The R.A.F. team consisted of: No. 1, Squadron Leader Shepherd, 267th Squadron; No. 2, Squadron Leader Gordon, Group Headquarters; No. 3, Air Commodore Samson, Group Headquarters; Back, Flight-Lieut. Maclean, 267th Squadron.

In golf the R.A.F., *versus* the Gordon Highlanders, on March 7, won by four matches.

R.A.F. team: Squadron Leader Shepherd, 267th Squadron; Flight-Lieut. Maclean, 267th Squadron; Flight-Lieut. Keeble, H.M.S. *Argus*; Flying Officer Harris, 267th Squadron.

United Services Championship

In the R.A.F. *versus* the Army, the R.A.F. were beaten by 13 points to 1½ points.

R.A.F. team: Squadron Leader Shepherd, Flight-Lieut. Keeble, Flight-Lieut. Stewart, Squadron Leader Kelly, Squadron Leader Gordon, Flight-Lieut. Maclean, Flying Officer Harris, Flight-Lieut. Sadler.

Polo Gymkhana, March 13 and 15

The R.A.F., both ladies and officers, played a prominent part, especially so the ladies. Mrs. Samson won 1st prize in the Ladies' 2½ Furlong Scurry, handsomely defeating her opponents. She also won 1st prize in the Ladies' Pig-Sticking.

Mrs. Maclean won 2nd prize in the Ladies' Musical Chairs, after having shown up very prominently throughout. Unfortunately, in the Ladies' Scurry she was left at the post, otherwise she stood a very good chance for a place on her form.

The ladies thus won two 1st prizes and one 2nd in the only three events open to ladies.

In the King's Messenger Race the R.A.F. put in two teams. The 1st team got into the final; the 2nd team were beaten on the first round.

In the donkey polo the R.A.F. were hot favourites, and after winning four matches they got into the final, but suffered defeat by 1 goal to nil.

The R.A.F. team consisted of: Flying Officer Smyth, back; Squadron Leader Gordon, No. 3; Squadron Leader Shepherd, No. 2; Air Commodore Samson, No. 1.

The semi-finals and final were played in fancy dress; the R.A.F. team dressed as members of the fair sex. Somebody was heard to remark that one member of the team had the best pair of legs on the island.

Altogether the R.A.F. in Malta are keeping the flag flying.

No. 11 (Irish) Wing

A DINNER is being arranged for all Officers who served in No. 11 (Irish) Wing, Royal Air Force, at the Hotel Cecil, Strand, W.C. 2, on Saturday, April 22, at 7.30 p.m.

The price of the Dinner, exclusive of wines, will be 10s. 6d., which will be collected from Officers at the Dinner.

Will Officers who wish to attend, please send their names to: Flight-Lieut. C. J. Mackay, Room 661, Air Ministry, W.C. 2. Dress.—Dinner jackets (Miniatures will not be worn).

ROYAL AERONAUTICAL SOCIETY NOTICES

Lectures.—The following preliminary programme of lectures for next Session has been arranged:

November 2.—Major A. R. Low, Fellow, "A Review of Airscrew and Helicopter Theory, with Aeroplane Analogies."

November 16.—Mr. R. McKinnon Wood, A.M.Inst.C.E., Fellow, "The Co-relation of Model and Full Scale Work."

December 7.—Professor C. F. Jenkin, C.B.E., Fellow, "Fatigue in Materials."

February 15, 1923.—Wing Commander T. R. Cave-Browne-Cave, C.B.E., Fellow, "The Practical Aspects of the Seaplane."

March 1, 1923.—Major F. M. Green, Fellow, "Helicopters."

W. LOCKWOOD MARSH,
Secretary



THE LONDON AERO-MODELS ASSOCIATION

The lecture given by Mr. W. E. Evans on "How to construct a Model Aeroplane Propeller" was very much appreciated by all present. Afterwards he gave a practical demonstration, making one from the rough block and showing the various stages of construction.

The Paddington and District Aero Club have become affiliated to the L.A.M.A. Two of the old school of Aero Modelists have also become members of the Association, i.e. Mr. D. Driver and Mr. A. E. Dodson.

On Thursday, the 13th inst., Mr. J. E. Louch will give a lecture on "How to construct a Record Breaking Model Aeroplane."

The Competitions Secretary, Mr. C. A. Rippon, 52, Fairbridge Road, Holloway, N.19, will be pleased to receive the names of all members who are entering No. 2 Competition for R.O.G. Duration Models limited to 4 ozs. minimum, which is being held on Wormwood Scrubs at 11 a.m. on Sunday next, the 16th inst. Any member being prevented from notifying can enter same on the ground previous to competition being started. Mr. Rippon will be present for such entries at 10.30.

It is understood that some of the members are contemplating record making after the above competition. It is hoped that non-competitors will put in an appearance as we want to demonstrate to the public the practical side of Model Aeronautics.

Meetings are held at 20, Great Windmill Street, Piccadilly, W. 1, at 7.30 p.m.

PUBLICATIONS RECEIVED

The Marine Oil-Engine Handbook. 6th Edition. London: Temple Press, Ltd. Price 3s. 6d. net.

Physical Properties of Dope Solvent Mixtures. By Guy Barr, B.A., D.Sc., and L. L. Bircumshaw. Aeronautical Research Committee Reports and Memoranda, No. 746 (M. 6). January, 1921. London: H.M. Stationery Office. Price 4d. net (post free 5d.).

The Buff Book Telephone Directory, April, 1922. London: Business Telephone Directories, Ltd., 25, Lawrence Lane, E.C. 2.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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26,338. M. A. KENNEY. Launching and landing apparatus for aeroplanes. (176,821.)

35,817. F. H. PAGE and HANDLEY PAGE, LTD. Means for balancing and regulating the lift of aircraft. (176,909.)

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